INTERACTIVE LOGO

Brusko A. V.
Igor Sikorsky Kyiv Polytechnic Institute
Radioengineering faculty
Supervisor – Myronchuk O.

Nowadays the interior decor is extremely diverse and every day new creative solution appears. But the interior of educational institutions is usually ignored, instead, standard solutions are used that are cheap, purely practical, and often unaesthetic.

Using the idea of IoT an interactive logo (of the faculty) with an Internet connection was developed, which allows anyone and anywhere to change the lighting mode, including color and animation. The device itself represents wall sign in the form of text and logo, which has the effect of contour light. Device control is implemented using an Internet connection and Telegram service. The backlight is based on several types of RGB LED strip: addressable and regular. The block diagram of the device is presented in Fig.1.

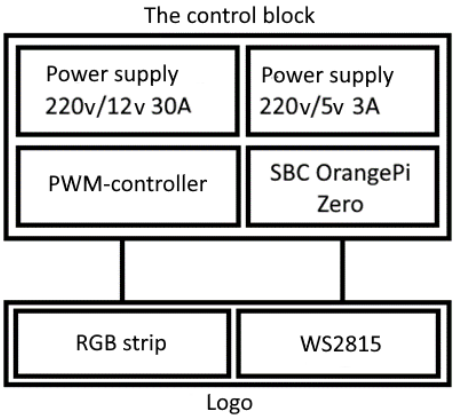

Fig.1 - Block diagram of the device

The device is powered by 220V. As can be seen from Figure 1, the control block contains an AC / DC converter, which provides a constant voltage of 12V on the power supply bus of the driver and LED strips. The second power supply provides operation of the single-board computer OrangePi Zero, which is powered by a constant voltage of 5V. An important point is that the grounding of these two sources is combined to match the logical levels of the data lines.

The driver (multi-channel PWM-controller) is implemented on the PCA9685 chip. It receives commands from a single-board computer, which polls the Telegram server for new commands, and converts them to a PWM signal with constant duty cycle and variable fill, which allows to control the color and brightness of a LED strip without a built-in controller. There is also a line on the driver board that connects the

single-board computer and the address strip. This decision was made for the ease of connection.

The use of OrangePi Zero is due to the presence of a multi-core processor and Linux operating system, which allows you to conveniently and quickly change the program code, perform multiple processes simultaneously, and provides convenient ways to connect to the Internet via Ethernet and Wi-Fi. Figure 2 shows a block diagram describing the operation of the device.

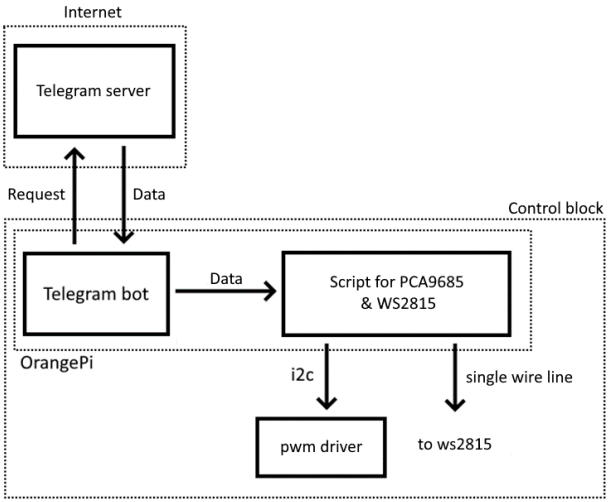

Fig.2 - Scheme of interaction of components

References

1. WS2815 12v addressable led chip datasheet
2. https://core.telegram.org/bots/api
3. http://www.orangepi.org/orangepizero/
4. PCA9685 16-channel, 12-bit PWM Fm+ I2C-bus LED controller Product datasheet
5. https://www.python.org/doc/